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Johne's Disease.*

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In 1913 Twort and Ingram (1) published their well-known monograph on Johne's Disease, since when very little has appeared in the professional press and little or no progress has been made.

The causal organism was discovered by Johne and Frothingham in 1895, and since that date many workers have studied the disease, notably Bang, Meissner, M'Fadyean and others. It is known to affect cattle, sheep, deer and goats, and is widely distributed over the whole universe.

It has various synonyms, depending on the country in which it is prevalent, but most of these make reference to a chronic enteritis. The term Johne's Disease, apart from being less descriptive, is also less clumsy than Chronic Pseudo-Tuberculous Bovine Enteritis, was originally suggested by M'Fadyean and is most commonly used in this country. Apart from its clumsiness, chronic pseudo-tuberculous bovine enteritis is not a good name, for there is nothing in the lesions to suggest the presence of tuberculosis.

The cause of Johne's disease is an acid-fast organism similar in many respects to the bacillus of tuberculosis and is to be found in the lesions.

The symptoms, which are well known to all of you, are progressive wasting accompanied by a diarrhœa, sometimes containing blood. The disease is invariably fatal.

Although the general practitioner may possess some degree of interest in such matters as cultural characters of the organism and other laboratory work, he is, of course, principally interested in the possibility of curing or preventing the disease. Up to the present no reliable or satisfactory method of preventing or curing Johne's disease exists.

I believe that our present knowledge of the disease, whether it be from an etiological or pathological standpoint, is very seriously lacking and I base my opinion on the result of work which I have carried out over the relatively short period of three years.

It is not uncommon, for example, to meet with a case of clinical Johne's disease which, on *post-mortem* examination, shews few or none of the classical lesions such as corrugation and thickening of the mucous membrane of the intestinal wall. In such cases, however, it is not difficult to isolate the causal organism from lymphatic glands of the large or small intestines. It has been stated by some that Johne's disease is a local disease affecting only the intestine and its associated glands and that in consequence it would be difficult, if not impossible, to manufacture a diagnostic which would produce a systemic reaction. I cannot subscribe to this belief, for I cannot conceive a condition which causes such ravages in the animal system not being general in its effect.

With regard to cure, most drugs and most combinations of drugs have been used from time to time, but up to the present no known cure for the disease has yet been published. Concerning prevention, one feels that had there been a practical solution to this difficulty which was efficient and not too costly it would have been adopted long ago.

Segregation and even the immediate slaughter of clinically-affected animals are insufficient, for, generally speaking, the damage is done and one still has the remaining members of the herd to deal with, which, although affected, are not yet showing symptoms and may not do so for some months. Worst of all, there are the infected pastures, which may remain a menace for many months. It is well known that the causal organism is very resistant to agents which are known to destroy non-acid-fast bacteria and in this respect it is about on a par with the bacillus of tuberculosis.

Twenty per cent. antiformin, although sufficient to destroy organisms customarily found in the fæces of bovines, will not destroy the bacillus of Johne's disease if left for twenty minutes. I believe, however, that it has in this time some deleterious effect, for primary cultures are somewhat retarded. It is clear, therefore, that this organism is very resistant to most substances which are quickly lethal to other and non-acid-fast organisms.

As previously stated, my intensive study of Johne's disease has extended over the relatively short period of three years, but, even so, I have formed certain opinions which appear to me to be sound. I believe, for example, that we cannot hope to stamp out this foul disease unless and until we are able to detect it in its very early stages and before clinical symptoms set in. From the chronic nature of the condition it is not too much to say, perhaps, that it may be present in an animal for many months and possibly years before it is clinically recognised and for how long before this the affected animal is voiding bacilli with its fæces can only be a matter of conjecture.

It frequently happens that the disease is not even suspected until a cow calves and then such animals appear never to recover from the effort of parturition. They remain poor. They are said to be "bad doers." Ultimately the true syndrome of Johne's disease sets in, a diagnosis is made and the animal is either sold or slaughtered.

Beebe (3) wrote in the *American Veterinary Review* in 1908, under the heading "Prevention," as follows:—"This is a disease which must be regarded as infectious and also of grave importance. It being of a chronic nature and as far as we know always fatal, makes it a very serious matter if it once becomes established in a herd. In the writer's experience cattle begin to lose condition for several weeks or even months before diarrhœa sets in and probably during this period the specific organisms are present in the fæces, thus exposing other cattle to infection."

M'Fadyean(4) in 1907, under a similar heading stated:—"In the present state of knowledge this is a matter of

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extreme difficulty in the case of farms on which the disease has existed for a number of years. Clearly the most rigid isolation of diseased and suspected animals ought to be practised. Indeed at present, and until some efficient method of treatment is discovered, it would appear to be best to destroy diseased animals as soon as a positive diagnosis can be made. The fæces passed by diseased or suspected animals ought to be destroyed. It is obvious, however, that these measures cannot be expected to prove immediately effective, for it is almost certain that infected animals may distribute the bacilli with their fæces for some considerable time before they show any indication of illness. The discovery of a means of cultivating the bacillus artificially might lead to the preparation of a diagnostic agent analogous to tuberculin, which would be of great service in this connection.

The question whether the disease ought to be scheduled so as to bring it under the provisions of the Contagious Diseases of Animals Acts deserves serious consideration."

I quote these paragraphs merely to show that even as long ago as 1908 such close observers as Sir John M'Fadyean had in mind the possibility of this disease being among the many already scheduled. If that were so in 1908 what can be the position to-day ?

Veterinarians engaged in country practices where Johne's disease exists will readily agree with me when I say that if only the true etiology of the condition could be established, the length of time which usually elapses between infection and the onset of symptoms, we should realise more fully than we do to-day perhaps, how vastly important it is to the stockowner that its ravages should be made to cease. The annual economic loss to agriculture from this disease alone must be enormous, for, apart from the ultimate absolute loss of diseased animals, there is the gradual loss of condition and consequent loss of market value, diminution in milk supply, infection of other animals and pastures.

In 1912, Penberthy(5) in moving the adoption of the report of the Cattle Diseases Committee, at a meeting of the Council of the Central and Associated Chambers of Agriculture, stated that " the Committee recommended that a deputation from the Committee should wait upon the Board of Agriculture to ask for the appointment of a Departmental Committee to inquire into the nature of Johne's disease. He said this disease was recognised under various local names, and it was to be feared that it was greatly on the increase . . . so far science had discovered no cure for it or any real practical measure for its prevention. Sometimes it affected only one animal on a farm and at other times a farmer might lose as many as twenty or thirty cattle."

Up to the present no Government has seen its way clear to assist the veterinary profession in the eradication of Johne's disease, and as we know of no cure and that the disease is ultimately fatal, agriculture continues to bear the losses.

I have spent some period in the last three years studying this problem and the more one studies it the more interesting it becomes. The work on which I have embarked is far from concluded ; it is, in fact, only just emerged from the chrysalis stage. In view of this I would have preferred to have postponed the reading of this paper for some time. Realising, however, that there are many of you who are bothered with Johne in your daily work it struck me that you might, if you are agreeable, be of immense help to me in my future studies and you will therefore see that I am just a wee bit selfish in asking you to discuss this particular disease. In view of the unfinished state of my work you will, I hope, make all necessary allowances.

I desire to bring to your notice a method of testing animals suffering from Johne's disease which, in my hands, has proved encouraging. The diagnostic is a substance which is prepared in much the same way as is tuberculin and which for the moment I will describe as " Tepsin." In the past I have invariably used it as a double intradermal test in precisely the same way as one uses concentrated tuberculin when adopting the double intradermal test for tuberculosis.

Twort and Ingram(6) published the result of some work in which they had attempted to produce a diagnostic for Johne's disease. They found that animals suffering from Johne's disease, either naturally acquired or experimentally infected, failed to react to a diagnostic vaccine prepared from cultures of the timothy grass bacillus or avian tubercle bacillus. Diagnostic vaccines prepared from cultures of Johne's bacillus, grown on a " tubercle bacillus medium," gave positive results to animals suffering from tuberculosis. This was, therefore, unsuitable for testing animals suffering from Johne's disease. Vaccines prepared from cultures of Johne's bacillus grown on a timothy grass bacillus medium, gave negative results with normal animals and with tuberculous animals, and also with cattle suffering from Johne's disease. The authors attributed this result to the fact that the growth of *B. johne* was sparce on fluid media and also that most of the growths were obtained from solid media.

As stated above, the method of testing cattle suspected to be suffering from Johne's disease which I have lately adopted is precisely the same as that method called the double intradermal tuberculin test. The only difference is that the dose is 0.2 c.c. repeated at the 48th hour instead of 0.1 c.c. as in the case of tuberculin.

It can be carried out simultaneously with the tuberculin test, the one being done on the right side of the neck and the other on the left side. Neither test, in my experience, interferes with the reaction of the other.

Interpretations. As in the case of the double intradermal tuberculin test, a reactor is recognised when a swelling, which is more or less diffuse and which may measure in diameter anything from 14 mm. to 60 mm., makes its appearance. A reacting swelling is also tender and may on occasions show a patch of necrosis at the point where the injection was made.

As far as I have been able to judge, it gives no reaction to animals suffering from tuberculosis alone or to normal animals.

Up to and including September, 1926, all experiments had been carried out at the Farm Laboratories at Mill Hill on clinically-affected animals which had been kindly presented to me by veterinary surgeons, and in this connection I desire especially to tender my thanks to the following gentlemen :—Mr. J. Craft, of Billinghurst,

Sussex; Mr. Sam Smith, of Horsham; Mr. T. F. Hogben, of Ash, Canterbury; Mr. Thos. Wallis, of Barnet; and Mr. Sydney Villar. But for the kindness of these gentlemen the work would have been difficult to carry out, if not impossible.

In October, 1926, Mr. Trevor Spencer, of Kettering, asked me to test a herd of cattle belonging to a client of his who had annually lost eight or ten animals from Johne's disease alone and who was anxious, if possible, to try and eradicate the disease from his herd.

This was the first and is at present the only herd on which I have used the test in the field.

I sent Mr. Spencer a supply of tepsin and also tuberculin. All animals were tested with tuberculin on one side of the neck and with tepsin on the other. Mr. Spencer communicated with me on the third day of the test and I gathered from him that the results were likely to be interesting. I was unable to visit the farm until the 96th hour of the test and at this time examined every animal with Mr. Spencer. The diagnosis had been made the previous day, of course, but the reactions were such that I was able to agree with Mr. Spencer in all cases, except one, twenty-fours hours after.

Altogether 49 animals were tested and the result was as follows:—

8 or 16·3 per cent. reacted to tepsin alone.
8 or 16·3 per cent. reacted to tuberculin alone.
13 or 26·5 per cent. reacted to both tests.
20 or 40·8 per cent. reacted to neither test.

I considered this result to be very encouraging, for I was able to deduce several important points from its study. Firstly it was clear that the one test did not interfere with the other; it was also clear that the tepsin was specific for some condition which was present in 42 per cent. of the animals tested; and most important of all is the fact that the tepsin failed to give any reaction whatever to 40 per cent. of animals tested or, in other words, it had no effect on animals which were probably healthy. It was necessary to settle these points definitely and an effort was therefore made to purchase some of these animals for purposes of *post-mortem* examination. Actually some were chosen which came under all four categories mentioned above and these were subsequently delivered. A start was made on their arrival, but owing to the lapse of time which had taken place since they were tested and their arrival at the laboratories (Oct. 25th, 1926, to Feb. 1st, 1927), it was deemed advisable to retest these animals.

Some of the animals which had not reacted to tepsin in October, 1926, gave a positive reaction on February 1st, 1927, and this applied also to some animals which failed to react to the tuberculin test in October, 1926. In no case, however, in which animals had previously reacted to either the one or the other did they fail to react again when retested.

To-day all the animals purchased (eleven in all) have been killed and examined. Only two of these could be described as clinical cases. Some were poor, but, on the other hand, several were in first rate condition.

I do not want to bother you with a list of the *post-mortem* appearances of all these animals. Suffice it to say that these will be published in detail in the near future and you will have an opportunity of examining the *data* at your leisure.

I will content myself with saying that in all those animals on which a *post-mortem* examination has been made and a sufficient length of time has elapsed, a culture of the causal organism of Johne's disease has been obtained from lesions found.

It would appear to be necessary, however, to describe to you in some detail the *post-mortem* appearances of an animal which during life showed no symptoms of Johne whatever, but which had reacted to the test, and for this purpose I select the last cow I killed as she is, to my mind, the most interesting of the batch.

This was a cow called "Old Daisy" and, as her name implies, she was not a heifer. In October she passed both the tuberculin and the tepsin tests. In February she was retested and the result was the same. Owing to the fact that I have found it difficult thoroughly to *post-mortem* more than one cow a week, some of them have not been destroyed until quite recently. The cows I left until last were the two which had previously passed both tests, and "Old Daisy" was one of them.

She was killed on April 28th, *i.e.*, nearly three months after the last test. She, with the remaining non-reactor, was therefore tested again and the test was commenced so that the 72nd hour, or the period when the diagnosis should be made, coincided with the date of her death.

On this occasion she reacted to both tests. The Johne reaction was very marked, the swelling measuring 25 mm. and was very hot and tender. The reaction to tuberculin was not so marked and only measured 15 mm., but was nevertheless positive. Its character was diffuse and its edges were feathery and there was definite but not marked tenderness.

On *post-mortem* examination no macroscopic lesion of tuberculosis could be found, but acid-fast organisms were found by smear preparation from the bronchial lymphatic glands. These have been planted on suitable media and injections carried out in guinea-pigs.

The only lesions which could be suspected as being those of Johne's disease were found at the lip of the ileo cæcal valve, the apex of the cæcum and portions of the ileum. In all instances the lesions were very slight. The cæcal valve possessed only a few commencing inflammatory areas at its edge. There were a very few linear reddened markings in the mucous membrane of the apex of the cæcum and the same appearance was seen in the ileum. Cultures are being prepared from all these sites but sufficient time has not yet elapsed for them to have produced macroscopic growth.

REFERENCES.

(1) F. W. Twort and G. L. Y. Ingram, "A Monograph on Johne's Disease."
(2) M'Fadyean, *Jnl. of Comp. Path. and Therap.*, Vol. 20, p. 53, 1907.
(3) Beebe, *American Vet. Review*, Vol. 33, p. 709.
(4) See (2) above.
(5) Penberthy, *Vety. Record.* Vol. 24, p. 498, 1911-1912.
(6) Twort and Ingram, *Proc. Royal Soc. B.*, Vol. 84, 1912.

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Professor J. B. BUXTON, the President of the Division, before calling upon Mr. Male to open the discussion, said: I think, in the first place, we may congratulate ourselves

that Major Dunkin has been good enough to come here to-day and to talk about work which is new, which is incomplete and, further, to seek the assistance of members of the Division to carry on his work.

I think if we analyse his evidence in the most critical manner possible we shall be forced to realise that he has had reason to suspect the presence of this disease in animals which had not shown it in the clinical form and that, as a result of that suspicion, after killing the animal he has succeeded in securing from it and growing the causal organism.

For some time there has been talk of making this disease a scheduled disease, but until you can diagnose a disease you cannot do that, and if he can enable us to diagnose this disease in the pre-clinical stage he will have gone a long way in helping us to eradicate it not only from the clinical point of view, but by legislative measures.

I may say that I am very much impressed with his work. I was present a few weeks ago when he opened a cow which I had sent him. I could see no sign of the disease but Major Dunkin was able to cultivate the organism from the ileo-cæcal valve of that cow. Whatever the outcome of the work may be, I am sure that we must recognise that he has at least gone very much further than anyone else has done in the past. I can only earnestly second his appeal that he may have your assistance in helping him on with his work, which must be of very great interest and value to the stockowners of this country (Applause).

Discussion.

Mr. G. P. Male: The President has asked me to open the discussion, but I have had no notice of the requirement, and consequently I cannot hope to do justice to the excellent paper we have heard from Major Dunkin this afternoon.

I have been very interested in this disease for a number of years and I think it was about twenty years ago that I described my first case in the South of England, which was, I believe, about the first case to be described there. On that particular farm the owner had lost a number of cattle each year, for at that time there was not much known about the disease. I killed one of the animals and I thought I had Johne's to deal with. I was able to obtain from Otto Bang, of Copenhagen, some avian tuberculin. I used it on this herd and I got what I thought were quite good results. A number of the animals (it was a Jersey herd) reacted and those cows were killed. The result was that instead of losing about ten to twelve cows each year we had no more cases of Johne's disease for three years—after that time we got perhaps one a year. We kept the pastures free of cows for a year and instead of keeping Jerseys they had Shorthorns which, in my experience, are not so susceptible to the disease as are the Jerseys.

I would like to ask Major Dunkin whether he has any *data* bearing on the time the organism can live outside the animal body, on the ground, and if other ruminants—for example, sheep—are able to harbour the organism and thus keep the pastures infected. In the case of these pastures the sheep were not removed and in my opinion this may have helped to perpetuate the disease. But there has been very little trouble with it since, on this particular farm. At that time, twenty years ago, there were not apparently many cases, or perhaps I ought to say not many were diagnosed, but I think it will probably be the experience of most of you that Johne's disease is greatly on the increase now—there are very few herds which do not have a case of Johne's disease sooner or later.

I am sure that we are very much indebted to Major Dunkin for the grand work which he has put in on this disease. It is one of the diseases which cause enormous losses in this country, and if he can get a diagnostic to tell us which cows are infected, it will be a very great boon to all of us. There is no doubt, I think, that the disease takes a long time to develop: my own opinion would be that it often takes years to develop, and if only we could diagnose the disease pre-clinically we should, as the President has said, go a long way towards eradicating it. Major Dunkin was good enough to send me, some time ago, some of his diagnostic agent, but I have not been able to give it a fair trial on many cows. In one case which I saw in consultation with Major Dunlop, we tried this agent, but the animal did not give a reaction. I do not know whether Major Dunkin has found that there is any difference in the reactions of cows that are far advanced from the reactions of those that are not, because with tuberculin it is, of course, a well-known fact that cases in the later stages of tuberculosis do not react as well as those in the earlier. Could Major Dunkin give us any information as to that?

Major H. C. Jagger: I should like to ask whether Major Dunkin has been in communication with Mr. Tutt, of Winchester. I noticed some time ago that that gentleman reported in the *Record* that in cases of Johne's disease he had injected into the jugular vein a solution of formalin, and he reported two or three successful cases, but I have not seen anything further.

Another point is as to the longevity of the bacillus. I have in my mind several farms, one in particular, where Johne's disease was very rife a matter of five or six years ago and now we rarely get a case, which looks as though the bacillus has the character of attenuating, much in the same way as does the bacillus of contagious abortion. In my district there has been a number of wonderful "cures" by the administration of petrol: in some cases the animals die promptly; in others the owners swear by it. The owners distinguish between Johne's disease and ordinary diarrhœa by the fact that there are copious bubbles present in the fæces in the former condition. On a certain farm a man has lost twenty good dairy cows from the disease in the last three years, and it is quite a point as to whether that farm is worth renting. The history of the farm is that as recently as ten years ago there was scarcely a case of Johne's disease ever known, yet it must have established itself very firmly now.

Mr. F. W. Willett: I should like to thank Major Dunkin for his very interesting paper. I have not seen many cases of Johne's disease in our district lately, but I have, on several occasions, seen the knacker yard full of animals which I should consider were cases of the disease. In view of that, I came to the conclusion that the farmers, when the Tuberculosis Order became operative again, thought that they were going to receive compensation for all their "wasters" and could make a good thing out of it. When they found, however, that this was not the case, as soon as they got a "waster" in which they could diagnose the existence of Johne's disease from the presence of bubbles in the fæces, they sent the animal off to the knacker—the farmers are clearing a lot of them out in that way.

In a case I was asked to see, rather a long distance from home—a first calf heifer—which appeared to be one of Johne's disease, I gave the owner ten doses of formalin, as I do not care to repeat these long journeys on such doubtful cases, and I thought the animal would probably be dead in a week. To my astonishment the owner wrote for another bottle of medicine and I sent him thirty-two doses. I had not received payment for this treatment which was nearly twelve months ago, and being near called and asked for my account recently. To my surprise the farmer said he was sorry not to have paid before but was pleased to do so now as the cow had done splendidly and was as well as possible.

Major F. J. Taylor: Major Dunkin has read an excellent paper, for which we all thank him. He was kind enough to send me some of his reagent which I injected in accordance with instructions in three cases of suspected Johne's disease. Two of them were mild cases and one was a very advanced one. I obtained a perfectly satisfactory reaction

from the two mild ones, but the one which I expected to show the greatest reaction showed none at all. However, I feel quite confident, in my own mind, that we have got a valuable agent here for diagnostic purposes, and if we can only detect the disease in its early stages I am sure that the Ministry will soon realise the necessity of scheduling Johne's with the other contagious diseases. The majority of cases that I am called upon (as an Inspector for the County) to examine, have been reported as tuberculosis under the Order; quite 75 per cent. of them turn out to be what I think is Johne's disease, and when I see a cow that has obviously wasted away, without a cough, and without any nodules in the udder, but that has chronic diarrhœa, I do not then attribute the diarrhœa to tuberculosis, but mark that case one of Johne's disease, which unfortunately we are unable to deal with under any Order at present, serious as the risk of further contagion undoubtedly is. There is an uncertainty in the minds of many veterinary practitioners as to whether Johne's disease and tuberculosis can exist in the same animal at the same time. I have had many opportunities of proving this to be the case. I have frequently found large lymphatic glands affected with tuberculosis, together with well-marked thickening of the bowels, due to Johne's.

I would like to ask Major Dunkin if, in his opinion, tuberculin would be likely to raise the temperature of an animal affected with advanced Johne's disease; also, when does the greatest risk of contagion or infection exist—at what stage of the diarrhœa, and what period of the year?

I have practised in several counties—Worcester, Dorset and Somerset—and I am now in Oxfordshire, and I can safely say that I have never, in all my experience, seen so many cases of Johne's disease in my life as I meet in this county. It is an exception in my practice to go on a farm and not to find several scouring cows, due to Johne's disease, particularly in marshy areas, which have been flooded during the winter. In fact, I am convinced there is a greater amount of Johne's disease amongst our farming stock than chronic tuberculosis, and that it is by far a larger and more important loss to the commercial agriculturist to-day. There is every reason for immediate legislature to combat this devastation of our stock. I think we are all agreed as to the necessity of preventing animals that are wasting away, and scouring, from being sent for sale, and it cannot be a very unusual sight to many of you to see emaciated animals being driven to sale yards, and scouring along the roads, obviously with Johne's disease.

In conclusion, I should like to ask, what is the possibility of infection *in utero*?

Mr. J. R. Baxter: I have had the pleasure of using five doses of your diagnostic. We had fairly good results with those that appeared to be cases of Johne's disease and in one that was not an obvious case we got the biggest reaction of all. Since securing that reaction the animal has been killed and *post-mortem* examination revealed very definite bowel lesions. In those apparent cures of Johne's disease which are so frequently reported following the use of this or that proprietary preparation, is it not possible that those are cases of coccidiosis and not of Johne's disease at all?

Major J. J. Dunlop: As one of the new members of your Society, I have very great pleasure in associating myself with the remarks of the previous speakers as regards their great appreciation of the work done by Major Dunkin on this disease.

Unfortunately in my district we have a great deal of it—it is becoming, indeed, a great nuisance to us. Mr. Male mentioned a case in which he and I met in consultation—a valuable Guernsey cow—and Mr. Male suggested that we should try this new diagnostic of Major Dunkin's. She had already been tested for tuberculosis, with negative result, and also with the avian tuberculin test for Johne's, which was also negative. When Mr. Male saw her she had been affected clinically for about two months, and we did not immediately apply the test because at that time she showed a decided improvement in her general health. It was, therefore, about another two months before the new diagnostic was applied. There was not the slightest reaction to this double intradermal test. As she went on getting worse we decided to slaughter her and on *post-mortem* there were very definite lesions of Johne's disease. That would perhaps bear on the point suggested by Mr. Male that the diagnostic is not so reliable in the later stages of the disease.

I should like to ask Major Dunkin, has he formed an opinion as to any particular situation at which one could start one's examination on *post-mortem*, when the usual pathological appearances are absent—say the ileo-cæcal valve, as in swine fever? Also, has he found that any particular breeds of cattle are more prone to be affected than others? I understand that the Channel Island cattle are looked upon as being more susceptible than others to this disease. Is there at any time during the course of the disease, a temperature shown amongst the other symptoms? One often finds, in cases which look like Johne's disease, that a more or less temporary improvement takes place: I should like to know if that can be explained in any way; also, if Major Dunkin has experimented with artificial infection and, if so, if he arrived at any conclusion as to the length of time elapsing before clinical symptoms manifest themselves.

Captain W. L. Little: I should like to ask Major Dunkin with regard to testing for tuberculin and his diagnostic for Johne's disease, does he mean that the animal, being affected with Johne's, reacts to tuberculin as well as to the Johne diagnostic, or is it that the animal is affected both with tuberculosis and with Johne's disease? I think that if he is able to produce a diagnostic for this disease he is going to give us enormous help and that the whole agricultural community would benefit by it very greatly. No one has mentioned the fact that, as shown by Sheather and M'Fadyean, it is possible to take pieces of mucous membrane from the colon during life, stain for acid-fast, and demonstrate the bacilli there, but I must say that one is not always able to do so. I remember one case in which I was unable to demonstrate the bacilli microscopically, but I was so convinced that I had the animal destroyed and in the fourth stomach I found a collection of pebbles large enough to fill a half pint measure. That was the second time I had found that condition in a cow and I thought that this animal had diarrhœa on account of the pebbles in the stomach interfering with her digestion. But I went on opening up and I was eventually satisfied that there were lesions of Johne's disease in the bowel. I think myself that when a cow has Johne's disease the stomach becomes deranged and she will gather up earth and similar material and eat it; in that way she may pick up pebbles, which in my cases lodged in the fourth stomach, though foreign bodies are generally found in the reticulum.

Mr. J. R. Hewer expressed his indebtedness to the essayist for his paper and for the work he had done, and continued: Major Dunkin kindly supplied me with some of his diagnostic material, but I have had very little opportunity of testing it. One beast which I thought had Johne's disease I tested with tuberculin and the Johne diagnostic, both intradermally, but there was no reaction. A second case which I tested within the last day or so showed a slight reaction to both tests. I will let you know the result on *post-mortem*.

The Reply.

Major Dunkin: I am very grateful to you for the kindly way in which you have expressed yourselves regarding the very incomplete information and *data* I have been able to put before you.

Professor Buxton made reference to a cow which he very kindly handed over to me at Cambridge for the purpose of the test. I saw her immediately before death and there was no question about the reaction. There was absolutely no evidence, on *post-mortem*, of the existence of Johne's disease: however, I was able to take some material away with me and I have to-day in my laboratories a growth which has not yet been examined but which, when compared with other growths, has led me to believe that it is a growth of Johne's bacilli.

I am glad that Mr. Male made reference to avian tuberculin. I have never used it, but I believe that reports as to its efficacy in the diagnosis of Johne's disease are by no means conclusive. I know that cases of Johne's have been reported in sheep—Stockman recorded a case in the *Journal of Comparative Pathology and Therapeutics* seven or eight years ago. If that is so, there is every reason to believe that they may be carriers of, if not actually sufferers from the disease. Mr. Male raised the question of the effect of the diagnostic in advanced cases. Most clinical cases of Johne's disease *are* advanced, but, in my experience these will usually give a positive reaction unless *in extremis*. In these latter cases one does not expect much of a reaction and, frankly, these are not the cases with which I am immediately concerned. Further, it is rarely necessary to test them, for a clinical diagnosis can usually be made.

In answer to Major Jagger, I have not been in communication with Mr. Tutt because I have found my hands fairly full with this side of the question to the exclusion of the curative aspect, but I have read his cases and am, of course, deeply interested. As to the disease dying out on a farm, Major Jagger answered that question himself, because later on he described to us a herd in which Johne's disease had not existed at all some years ago, whereas nowadays they were losing animals every year. Mr. Willett has not seen many cases in his district, but he has observed it in the slaughterhouses; that is not uncommon. I have had no personal experience of the use of formalin as a cure. Major Taylor has kindly sent me his report. He has two positive reactors and one negative. Why, I cannot explain. I cannot say whether it is a question of the potency of the tepsin, of clinical diagnosis, or of individual sensitiveness. He asks at what stage of the diarrhœa the greatest risk of contagion or infection exists. I consider that whenever there is diarrhœa there is always a risk, because it is essentially an intestinal disease. Of course, the more advanced the case the more risk there is.

I should say that the risk of infection *in utero* is very slight indeed, probably negligible. Mr. Baxter has also used some of the material I sent him. He raises the question as to the possibility of some suspected Johne cases being cases of coccidiosis. That is a very important question, of course, and it is highly probable that some of them are, especially in marshy districts, because in cases of bovine coccidiosis you do get wasting, diarrhœa and "bubbling." I should not like to say that I could differentiate clinically between the two.

Major Dunlop made reference to the case in a Guernsey cow which Mr. Male saw in consultation with him. That was a clinically-affected case, proved on *post-mortem*, which gave a negative reaction to the tepsin I sent to Mr. Male. I was not able to gather if that was to be described as a very advanced case indeed when the animal was tested?

Major DUNLOP: Yes, I should say it was.

Major DUNKIN: The probability is that there is the old question of sensitivity creeping in. When I have been puzzled it has been in advanced cases. I am concerned with ascertaining the existence of the disease in animals which show no symptoms whatever, with the object of eliminating them from a herd which is known to be affected.

I believe the ileo-cæcal valve is the first organ in which macroscopic lesions are first apparent. That is merely an expression of opinion, because in the case I have sent round you will note that unless you look closely you cannot see any lesion at all. That sort of lesion there I have come to look upon as being the commencing lesion of Johne's disease. I am not prepared to say that such a lesion cannot be caused by anything else, but I have found Johne organisms in lesions similar to that in several animals from this particular farm. The animals sent to me numbered about 150 and I would place them in the following order of susceptibility—Shorthorns, Jerseys, Guernseys and Sussex.

In regard to the exhibition of temperature by animals suffering from Johne's disease, I have come to consider this as being unreliable. Some animals show a temperature,

(Continued at foot of next column.)

CLINICAL AND CASE REPORTS.

Toxicity of Carbon Tetrachloride to Sheep and Cattle.

By J. H. NORRIS, M.R.C.V.S., Director Veterinary Research Laboratory, Drumcondra, Co. Dublin.

A considerable experience with the administration of carbon tetrachloride to sheep had fairly convinced me that the drug was safe for these animals in comparatively large doses. Reference in recent numbers of the *Record*, show, however, that the drug may be highly toxic to sheep under certain conditions. I have had one only such experience, and, as I consider it important that these cases should be published, I give the details.

The flock in question was a valuable one of pedigree Suffolks made up of seven rams, twenty-four pregnant ewes, sixty-five suckling ewes with young lambs, and twenty-nine hogget ewes. All the animals were at pasture, but the rams had received hand feeding during the winter, and the suckling ewes and hoggets for a period of two months prior to dosing. The pregnant ewes received no hand feeding. The rams were running on new grass, the others on old pasture. The dry feed was a mixture of the following:—crushed oats, 10 cwt.; dried grains and cotton seed meal, 5 cwt. each; fish meal, 2 cwt.; salt, 3 st.; with ½lb. lime and 3lb. bone flour per 100 lb. added for the rams. Of this mixture the rams received 1½ lb., the suckling ewes 1 to 1½ lb., and the hogget ewes ¾ lb. daily. At the time of dosing the animals were in good condition, with the exception of ten ewes and two or three hoggets which exhibited clinical symptoms of liver rot. The dose of carbon tetrachloride given to each animal was a single one of about 2 c.c. in hard capsules. The sheep were not fasted prior to dosing, but the drug was administered in the morning before the dry ration was offered.

The results of dosing were: all the rams and suckling ewes became ill, exhibiting symptoms of dulness or prostration, constipation, passing small quantities of blood-stained fæces, complete refusal of food, and milk supply in ewes greatly diminished. Two ewes died within twenty-four hours and a third ewe on the second day after dosing.

A *post-mortem* examination on the latter animal, made some hours after death, revealed petechial lesions in the abomasum, small and large bowels and omentum; liver

(Continued from previous column).

some do not, and whether the temperature is or is not due to a phase of the disease I am not sure.

It is the fact that temporary improvement is sometimes noted, particularly in regard to diarrhœa, which seems to be intermittent in many cases. I am not in a position to explain that, either. Concerning artificial infection, that is a piece of work in which I am now engaged, but at the moment I am confining my attention to goats, which, as you know, are also susceptible.

Replying to Captain Little, I did not intend to convey the impression that animals reacting to tepsin also invariably react to tuberculin. Some of the animals reacted to tepsin alone, some to tuberculin alone, some to both, and some to neither.

The remaining question of importance which needs to be cleared up is, if this particular test is going to be of any value to the clinician in the field it is necessary to find out what time elapses from the date of infection to the date at which the animals become sensitive to the test.

decomposed; heart and lungs normal. The remainder of the animals recovered after some days. *The pregnant ewes and hoggets showed no ill effects.*

The experience in this case shows that the drug was toxic to the animals receiving a *full ration* of dry feed, and that no ill effects followed in the pregnant ewes which received no dry food, and in the hoggets which received a small ration. The drug used was supplied to the owner's veterinary surgeon from this Laboratory, and was tested on sheep in 30 c.c. for impurity before issue. The balance of the drug remaining after dosing was obtained, and tested on a ram, a pregnant ewe and four wethers, in doses up to 15 c.c. no ill effects following. These animals were at pasture, and receiving no hand feeding.

The following experiments, so far as they go, would indicate that suckling ewes receiving no artificial feeding have a normal tolerance to the drug:—

Ewe No. 1, suckling two lambs, sixteen days old, received 20 c.c. in hard capsules. No ill effect on ewe or lambs.

Ewe No. 2, suckling two lambs, twenty-three days old, received 15 c.c. in hard capsules. Ewe showed increased respiration for about 30 minutes after dosing. No other ill effect in ewe or lambs.

Ewe No. 3, suckling two lambs, twenty-seven days old, received 10 c.c. in hard capsules. Ewe was somewhat dull for twenty-four hours after dosing. Lambs showed no ill effect.

Ewe No. 4, suckling lamb, forty-three days old, received 20 c.c. in hard capsules. Ewe was distressed, with staggering gait, for three or four hours after dosing, but was normal within twentyfour hours. This was a small animal, and showed similar symptoms after a 20 c.c. capsule last season when not milking.

A limited experience during the past winter in the treatment of fluke-infested cattle shows that the drug is very poorly tolerated by such animals; even 2 c.c. doses may be followed by toxic symptoms for a day or two, after which complete recovery may be fairly rapid. It is worth noting that all these cases were receiving hand feeding at the time of treatment. A healthy bovine of similar age on pasture may tolerate doses of 60 c.c.

The evidence, such as is available, indicates that the toxicity of the drug is closely related to the kind of food the animal is receiving at the time of dosing. No doubt the reason for this will be forthcoming in due course; in the meantime, it would be helpful if members would publish details of their experience with the drug.

An Unusual Fracture.

By C. S. Northcott, M.R.C.V.S., Capt. R.A.V.C.

The subject was a bay mare, aged eleven years, which was turned out to grass on the 3rd May, 1927. On entering the field, which contained some twenty horses, the mare cantered about and on joining the other horses, which were moving about *en masse*, was seen to slip up on turning at a corner of the field. The near fore limb was markedly abducted and the mare fell. On rising, which was attended with some difficulty, she was observed to be very lame near fore.

Examination of the limb revealed fracture of the bones in the region of the carpus.

The temperature was 102.4°F., pulse accelerated, and the mare shewed trembling of the muscles of the forearm and shoulder of the affected limb.

The mare was destroyed, and on *post-mortem* examination a comminuted fracture of the carpus and metacarpus into over forty pieces was found.

On exposing the affected area by removing the skin, the carpal sheath was ruptured and a frothy hæmorrhagic discharge exuded; small pieces of bone pierced the carpal synoval sheath. The tissues surrounding the joint appeared as "pulp," pieces of bone being embedded in a hæmorrhagic and infiltrated mass of tendinous and ligamentous tissue. Considerable bruising of the surrounding tissues occurred. It was also observed, on clearing up the mass, that ligamentous attachments to bones were intact except in the case of certain interosseous ligaments, namely, between the scaphoid and trapezoid bones.

The lateral ligaments had been lacerated in part by what appeared to be the result of the sharp edges of broken pieces of bone. Thus it would appear that the ligaments, on the whole, had withstood the strain at the expense of the bones.

Some rarification of bone was noticed, particularly in those bones that had been fractured.

The bones fractured were the os semilunar, os magnum and os unciform, the heads of both small metacarpal bones, and portions of the proximal end of the large metacarpal bone had been chipped off.

Is Nymphomania in Cows a Deficiency Disease?

By A. Spicer, F.R.C.V.S., Oxted.

I have now treated ten cows for the above disease. Of the first four, which were treated by breaking down the cysts about every ten days for a period of from four to six months, two were cured; that is to say, they were got in calf. The two others proved incurable, one a heifer and the other an old cow that had given two thousand gallons in the twelve months.

It then occurred to me to try the treatment of breaking down the cysts, and also putting the cows on to a course of potassium iodide at the same time, as this drug is supposed to have some action on all gland tissues. Six cows in all have been treated, with five successes and one failure. I think that this cow could have been cured, but owing to ill-health, very hot weather and the stress of a busy practice, the treatment was very irregular.

The other five animals, of which one was a heifer, only required about five visits each, with intervals of ten days. Four, including the heifer, were got in calf and the fifth lost all the symptoms of a nymphomaniac, but only showed bulling about every six months and was sold fat to the butcher. The symptoms of nymphomania disappear very quickly under this treatment, which is a great advantage, as the cow can be turned out with the rest of the herd.

One feature of the treatment is that the walls of the cysts become very tough and take a lot of breaking down and it is seldom that this can be done through the wall of the rectum. In fact, it is sometimes impossible to do it at the

time but it can usually be done at the next visit, a week or ten days later.

I spayed the cow that had proved a failure and the walls of the cysts were then so tough that they could not be broken down even when one had the ovaries outside, and they had to be cut with a knife.

The first cow I treated has since had four calves, and a few weeks ago began to show a recurrence of the disease; but directly she was put on potassium iodide the symptoms ceased.

Does potassium iodide have an inhibitory affect on the gland, or does the disease arise because there is a lack of iodine in the system?

It does not appear possible to cure the disease with the iodide alone; the cysts must be broken down at the same time.

REVIEW.

[**Poultry Diseases.** B. F. KAUPP. London. Ballière, Tindall and Cox. 1927. Fourth Edition. Pp. 393. 158 illustrations. 15s.]

The appearance of a fourth edition indicates the continued popularity of this book. Many new features have been introduced, including a chapter on physiology and several excellent charts illustrating parasites and cycles of infection. All the important diseases of poultry are discussed in a very readable and useful manner.

The table of sugar reactions on page 81 will not, however, be generally accepted, especially the statement that the causal organism of fowl typhoid ferments lactose. *Bacillus pullorum* is described as rendering litmus milk acid, later becoming alkaline. Although it is well known that reliance cannot be placed on one test to eradicate bacillary white diarrhœa from breeding stock, this point is not mentioned.

We recommend this book to our readers as one which will be of the greatest assistance in combating diseases of domesticated birds. J.P.R.

ABSTRACTS.

Etiology, Diagnosis and Prevention of Epizootic Abortion in Mares. By MM. L. Panisset and J. Verge. *Revue Générale de Médecine Vétérinaire*, March 15th, 1927.

Epizootic abortion in mares is caused by *Bacillus abortus equi*. It is present in the fœtal membranes, the blood, the bone marrow, and in the liquid contained in the stomach of the fœtus, yet it is difficult to demonstrate it directly; microscopic examination neither reveals it nor differentiates it from other Gram-negative bacteria. But the germ grows abundantly on all media. The optimum PH varies from 7·2 to 7·4.

It is a polymorphous bacillus from 2 to 5 μ long, with rounded ends. Some bacilli show a bipolar coloration; the coccobacilli may form chains. It appears in straight or wavy filaments of from 4 to 20 μ in old cultures in broth. It is fairly motile. It is Gram-negative. It is acid-fast, but takes all the anilin dyes. It grows in air and in the absence of oxygen.

The bacillus grows well at a temperature of 18 to 20°; to preserve its vitality, the organism should be sub-cultured every month. In sealed tubes in ice, the germ remains alive for more than 200 days. On gelose, it develops abundantly as a moist, creamy-white streak, sometimes as a dry, fine, semi-transparent culture. In broth an abundant even clouding is formed. It coagulates litmus milk in twenty-four hours, without changing its colour, but the lacto-serum is blue after a month in the incubator at 37°. It produces a moist, creamy growth, first whitish, later turning black, on potato. It does not cause the formation of indole or of sulphuretted hydrogen. It ferments glucose, galactose, laevulose, saccharose, maltose, mannite, and dulcite, causing the production of gas.

By its cultural, biochemical, and serological characters, it belongs to the Salmonella class, and forms part of the group of *Paratyphosus B*. The authors incline to the hypothesis that *Bacillus abortus equi* and *Bacillus enteridis breslau* or the *Aertrycke bacillus* are very closely related, if not identical.

While the dog, the hen, the pigeon are unaffected by considerable quantities of culture, the white rat, the guinea-pig, and the rabbit are killed by slight doses. The white rat is killed in forty-eight hours by an injection into the peritoneum of 0·5 cubic centimetre of the culture, and the blood of the heart contains the bacillus in great quantities. The guinea-pig dies in two to five days from an intraperitoneal or subcutaneous injection of one cubic centimetre, and the germ is found pure in the blood of the heart. The rabbit is killed in seven days by a dose of one cubic centimetre.

A subcutaneous injection of one cubic centimetre of filtrate made from a culture diluted in physiological serum and kept in the incubator for a month at 38° causes the death of guinea-pigs in forty days; cultures from the blood of the heart, the liver, the bone marrow, remain sterile. The rabbit, the hen, and the pigeon are unaffected by an injection of the filtrate.

Subcutaneous inoculations of two guinea-pigs with one cubic centimetre of culture caused abortion. Attempts at producing experimental abortion in rabbits failed. Rabbits vaccinated with one cubic centimetre of culture resisted an inoculation made three weeks later of two cubic centimetres of culture, while a non-vaccinated rabbit, used as control, died eight days after the injection.

Diagnosis of epizootic abortion is made certain by agglutination. Females that are healthy or have aborted either accidentally or through an infectious streptococcic or colibacillar infection have a serum whose agglutinating qualities in relation to *Bacillus abortus equi* are not marked: 1 : 10, to 1 : 300 at most. Mares whose abortion is due to the specific microbe have a serum which agglutinates this germ from 1 : 200, to 1 : 1,000 and over. Consequently any animal for which the limit of agglutination is below 1 : 200 should be considered healthy, while animals for which it is above 1 : 300 are infected. If the serum agglutinates *Bacillus abortus equi* between 1 : 200 and 1 : 300, examination should be repeated after a month's interval.

Furthermore, heating to 56° causes rapidly and to a considerable extent the disappearance of the natural agglutinins, while heating to 56° has no effect on the specific agglutinins.

Active immunisation allowed rabbits to resist the inoculation of a fatal dose of culture. Immunisation is easily obtained by starting from cultures killed either by heat or by the addition of various antiseptics. The authors, taking care not to reduce too much the virulence of the germs, produced a vaccine which causes slight thermic, organic, and local reactions in the animal vaccinated. The organic reaction is slight. The thermic reaction appears as a rise of temperature, seldom of more than one degree. The local reaction consists in the formation of a small œdema some hours after the injection. All these phenomena disappear in forty-eight hours.

Vaccination is strictly preventive; the usual sanitary measures should not be neglected. The animal should be vaccinated as near the beginning of pregnancy as possible, and not after the third or, at latest, after the fourth month. Vaccination is useless once abortion has appeared in a stud, nor does it prevent mares that have aborted from being able to spread the disease.

The efficacy of vaccination, according to MM. Panisset and Verge, is proved by a campaign carried out in several studs, in France and Roumania, and by more numerous experiments in different regions, notably in Brittany.

R. L. Higgins.

Contribution to the Study of Pyotherapy.

Thesis by Joseph Tissot.

This interesting work admits the following conclusions:—

I. Pyovaccine is a homogenous emulsion of pus removed aseptically and sterile.

II. No appreciable local reaction has been noticed at the site of inoculation.

III. As a result of injections of pyovaccine, we have observed neither rise of temperature, nor depression, nor lack of appetite; in a word, none of the symptoms which constitute the syndrome of fever.

IV. Pain is rather less acute, and sometimes even disappears, at the site of the lesions.

V. During the negative phase, little islands of necrosis are sometimes spontaneously eliminated, which facilitates surgical intervention.

VI. The injection of pyovaccine has manifestly the effect of changing the nature of the pus; having been flowing and putrid, it becomes thick and grumous.

VII. It appeared to us advantageous not to inject pyovaccine while the negative phase lasted.

VIII. The appearance of the positive phase is always accompanied, not merely by a favourable change in the character of the pus, but by a regular, rapid development of pimples, to such an extent that it is sometimes necessary to moderate this development.

IX. The regular progress of cicatrisation necessitates injections made at intervals of 4 or 5 days.

X. Pyovaccine which had been kept in a cool place for three or four months produced as much effect as when recently prepared.

XI. Pyotherapy facilitates and assists surgical action, but does not render it unnecessary.

XII. Pyotherapy does not exclude asepsis. It reduces antisepsis to a secondary rôle.

XIII. Tetanus, pyæmia, and septic infections may arise in spite of the paraspecific action of the pyovaccine. The serous and medicinal injections prescribed in such cases should be used.

XIV. Pyotherapy is not vaccinotherapy, because it is not specific, and does not confer immunity. It merely stimulates phagocytosis, thus increasing the natural defence of the body.

XV. Pyotherapy owes its action "to the leucocytes of the pus, or to the leucocytic débris and the products which are derived from them" (Bridré).

XVI. "Pyotherapy is a simple, economic method . . . which by the results it has already produced and which we are justified in expecting from it to-day, should take a place of the first importance in the veterinary therapeutic arsenal, not as a panacea, but as a valuable assistant to surgical intervention" (Velu).

(*Ex. La Semaine Vétérinaire*, May 12th, 1927.)

R. L. Higgins.

STUDENTS' CONTRIBUTIONS.

Ablation of Two Quarters of the Udder.

By R. E. C. Dowling, Royal Veterinary College, London.

Subjects.—Two cross-bred cows.

Date of operation.—August 14th, 1925.

History.—The cows were both attended daily for about a month prior to the operations, treatment being carried out in the form of injections into the affected quarters, with a view to curing the suppurative mastitis from which they were suffering. Constitutional conditions, primarily due to the mastitis, were also treated, during this period, by febrifuges, internal antiseptics and stimulants. No definitely progressive good results were achieved, however, and this was probably due to the fact that the mastitis was too far advanced before veterinary aid was sought, as other cases of the same kind were making good recoveries under exactly similar treatment on neighbouring farms.

Clinical History.—When first seen, the cows were in poor condition, with staring coats and the hocks were somewhat swollen. In each case thick pus could be drawn from the affected quarters. The temperature in each case also was elevated. No doubt this elevation of temperature, the swollen hocks, and the poorness of condition, were due to the absorption of toxins by the blood from the seat of infection. Under the treatment above described, the animals at first appeared to improve, but after some weeks the condition could be seen to reach a standstill, and it was at this point that the owner was advised that the only method of reducing his losses was to have the affected quarters removed to stop the infection, and then fatten the beasts for the butcher. To this he agreed, and the operations were performed a day or two afterwards.

Operations.

(*a*) *Cow No.* 1.—Hobbles of rope were applied to the hind fetlocks and the cow then cast by the additional use of side lines (although hobbles may seem unnecessary, they had the advantage of facilitating fixation of the limbs when the animal was prone). The cow was then roped up in the dorsal position. A Cox's muzzle was then applied, and chloroform used to anæsthetise. The whole udder was then

well washed, together with the surrounding parts of the body, and all were afterwards disinfected with a solution of lysol. An incision was then made at the base of the gland over the region of the mammary artery, on the side affected, and the tissues carefully dissected away until the artery was located. It was then traced upwards until the junction of the anterior and posterior branches was reached. Just above this a double ligature was applied and the artery resected between the two ligatures. (The upper ligature was of thick material, the object of this being to prevent early sloughing of the ligature. The purpose of seeking and ligaturing the main artery early was to prevent excessive hæmorrhage during the operation). The skin was then incised practically the whole length of the udder from behind forwards, the line taken being parallel to and about three or four inches from the region of the median septum. Local hæmorrhages were attended to as they arose. These were frequent, owing to the great vascularity of the part as, although the main artery was ligatured, the collateral vessels of the udder were found to be a veritable network. Hence limited and unlimited torsion by Spencer Wells' forceps by the operator and his assistant was frequently necessary during the operation; no less than a dozen pairs of forceps being more or less constantly in use. Blunt dissection, with few exceptions, was used throughout, after the first incisions had been made and the artery ligatured. The two first-affected quarters were first freed of all adjacent skin, and then were carefully dissected from the sound quarters of the other side at the median septum. This latter separation was not found difficult owing to the septum being double, *i.e.*, each pair of glands having a distinct wall of its own. The two quarters having been thus removed, a large piece of superfluous skin was then removed with the knife and the remainder sutured to the flap of skin left protruding along the inferior edge of the septa. Continuous sutures were used, and at each end of the udder a breach was left in the skin to allow for drainage and injecting.

(*b*) *Cow No.* 2.—The method of operation in this case was not altered. After this operation, however, the blood clot was collected from the grass and measured in a large milk pail. It was a little over one and a half gallons.

Both animals regained their feet a few minutes after their respective operations were finished.

After Treatment.—A large brass syringe and some disinfectant solution were left with the farmer, and he was instructed to syringe out the udders twice daily and to free any blood clot that might form, by the fingers, if necessary. The weather being cool on the day of operating, the operator consented to the cows being allowed out in the paddock between the times of syringing. The farmer was further instructed to telephone the veterinary surgeon in the event of any complications arising.

RESULTS OF AND COMMENTS ON THE OPERATIONS.

Unfortunately, complications soon arose, and the operator (contrary to instructions) was not notified. A visit was paid to the farm three days afterwards and Cow No. 1 was found dead in the field. On examination, her udder was found full of blood clot. Cow No. 2 was still on her feet though not grazing and, on being brought up, it was noted that she was much distressed. Her temperature was much elevated, her pulse weak and the wound septic. The sutures were immediately removed from the wound, and a huge blood clot, larger than an ostrich egg, removed from the cavity in the udder. The wound was then well swabbed out with antiseptic solution, and the sutures were not reinserted. Injections of sol. adrenalin chloride, 1-1000, were given subcutaneously for four days in 5 c.c. doses, while pot. nitrate was given internally to reduce the temperature, and pulv. nucis vom. as a general stimulant The latter treatment was carried out daily for a week. The cow was kept in a loose box with plenty of straw bedding, and a sloppy diet and plenty of drinking water advised. Daily attention to the wound for a period of ten days was carried out, and it healed beautifully.

This cow made an excellent recovery.

N.B.—The operations would have been more successful, no doubt, had the cavities been packed with antiseptic tow or wool before suturing, as the operator suggested that the stretching of the tissues, so achieved, would have kept the hæmorrhage from adjacent capillaries in check to a large extent. Furthermore, it was unfortunate that the day following the operations proved to be exceptionally hot and the sun powerful. This fact undoubtedly favoured the development of sepsis in the wounds, and hastened the death of Cow No. 1.

Tricuspid Stenosis in a Calf.

By G. A. MOORE, Dublin Veterinary College.

The subject of this case was a calf about nine months old and in fairly good condition. When we saw it it had a large swelling, apparently œdematous, in the dewlap. The visible mucous membranes were cyanosed, the coat staring and the extremities cold. The temperature was 98°F. On ausculation there was noted a marked irregularity in the heart. The systolic sound was replaced by a murmur. The cardiac impulse was very weak and the right leg had to be drawn very far forward in order to hear the heart at all. The pulse was weak and accelerated—two hundred to the minute. There was also a faint jugular pulse. The bowels were quite regular and there was no evidence of any disease of the alimentary tract. The animal showed marked disinclination to walk, appeared drowsy, shook its head in a weary sort of way occasionally, its ears drooped and its head was carried very low.

That the calf had traumatic pericarditis was ruled out by the facts that there were no digestive disturbance, no rise in temperature and that the mucous membranes were cyanosed instead of injected. Besides, the heart sounds did not agree with what occurs in traumatic pericarditis.

On making enquiries of the owner, we learned that about two months previously the animal had been unwell. It stopped "cudding" for a couple of days, appeared slightly stiff in its legs, especially in its hind legs. The owner administered a pint of linseed oil and the animal recovered without professional aid. We came to the conclusion that this was a mild attack of rheumatism and that probably the disease now present was endocarditis accompanied by thickening and partial stenosis of either the mitral or tricuspid valves.

The owner was informed that the case was hopeless, but agreed to put the animal in a float and bring it into the yard so that we might keep it under observation. Doses of digitalis were administered by the mouth, but they had no effect owing, probably, to the drug being destroyed in the rumen.

Two days after its entry into the infirmary the calf developed symptoms of congestion of the lungs and liver. The pulmonary sounds were almost entirely absent; the animal coughed a little, breathed through its mouth, gasped and occasionally it frothed at the mouth. Digestive symptoms appeared, indicating congestion of the liver. The fæces became hard and the urine scanty in amount. The conjunctiva became somewhat yellowish. All these symptoms appeared gradually, but they were first noticed at the time stated. The groom also told us the calf used to drink large amounts of water but that it ate very little. The animal's condition got gradually worse, and eight days after its entry into the infirmary it died. It was found dead in the loose box one morning. During its last few days the excessive coldness of its mouth, lips, extremities, and the surface of its body generally, was very remarkable. Its temperature was 97-98°F. and the night before it died it failed to register a temperature on the thermometer at all. The swelling in its dewlap had increased to the size of a football.

On making a *post-mortem* exanination it was found that the subcutaneous connective tissue was infiltrated with serous fluid, giving it a yellowish and gelatinous appearance. The swelling on the dewlap was composed of fluid and tissue

(*Continued at foot of first column next page.*)

DIVISIONAL REPORTS.

Midland Counties' Division.

The Application of Gland Therapy to Veterinary Practice.

(*Continued from page 587.*)

Dr. J. Stanley White than delivered his address on "The Application of Gland Therapy to Veterinary Practice." The paper was virtually a slight revision of that presented to the Southern Counties' Division on March 25th, 1926, and recorded in the *Veterinary Record* on May 22nd and 29th, 1926.

It was followed with marked interest, and a series of lantern slides was afterwards shown in an adjoining room.

To the resultant discussion numerous members contributed.

Mr. Tudor Hughes referred in particular to the evidence that the thyroid substances could be taken by the mouth, without suffering destruction in the process of digestion, whereas the other glandular substances did not appear to exert the same activity when taken by the mouth as when injected. This militated against their practical use, because the veterinary surgeon could not always be there to administer them hypodermically. If they could have the relative effect of one hormone in contrast to another it would be of great help in studying gland therapy. He asked whether they had a condition affecting the hormone balance in an animal where trembling and shivering for a long period was associated with acute perspiration. In the case which had come to his notice the condition had lasted for thirty-six hours. In connection with para-

(*Continued from previous page.*)

of a similar character. The peritoneal and pleural cavities were infiltrated with a considerable quantity of serous fluid. The kidneys and liver were congested and enlarged, and of a redder colour than normal. The liver weighed nearly a stone. There was practically no ingesta in the stomachs or intestines, the rumen containing the most. The mucous membranes of the alimentary tract were as white as paper. The lungs were congested and presented numerous very dark-red areas of infection, caused by embolism of branches of the pulmonary artery. There were three or four small hæmorrhages noted, some larger than a threepenny piece, on the pericardium and on the medial surface of the lungs. The heart was enlarged and paler in colour than normal. The right auricle was very much dilated. The substance of the heart could be easily broken down with the finger. The segment of the right auriculo-ventricular valve lying between the auriculo-ventricular opening and the sinus arteriosus was enlarged and about the size of a small hen's egg. This caused almost complete occlusion of the opening; there was about sufficient space left to pass a quill through. The enlarged segment was whitish in colour, smooth and convex on its auricular surface and irregular on its ventricular surface. Its cordæ tendinæ had disappeared. On being cut into, the enlargement appeared to be composed of new fibrous tissue in its deeper layers and granulative tissue on its surface layers. The surface could be easily broken down with the finger nail. There was an area of hæmorrhage around where the valve was attached, on its ventricular side. There was also a sub-endocardial hæmorrhage beside and partially on one of the papillary muscles of the septal wall. This was about the size of a sixpence.

thyroid therapy, it would be a help to them to have an idea of the cost of treatment in comparison with the value of the patient. That was a point which did not arise in human practice.

Mr. Livesey, who said he took credit for being the first to introduce Dr. White to the veterinary profession in England, said the doctor moved with the times, and his lectures were more interesting and entertaining each time they were heard. The speaker voiced a warning of the harm that might be done with pituitrin if it was not used properly. It was possible to give too much. He had got all the result he required from doses of four to ten minims, and larger doses were no better. The treatment would not have a marked effect unless there was clear knowledge of the condition pre-existent.

As to non-presentation of the fœtus, the speaker expressed the view that if one dose did not help, a dozen might not, but might quite conceivably kill the mother.

Mr. Brooke said he had listened to several of the doctor's lectures, and always left with a sense of gain. He had once thought that one or other of the vaccines would solve all the problems of disease. He knew now that was not so, and that while they were of assistance they had not got to the end of their difficulties. As to thyroid and parathyroid administration, either by the mouth or hypodermically, he would like to ask the dose likely to be of service. He had just now a boarhound under notice, which, after showing intestinal infection, drifted on to chorea. He had used other methods with some improvement, and then passed on to parathyroid. The symptoms had improved after this, but there was still some twitching and swelling, particularly at the side of the face.

Mr. H. W. Dawes, in the course of his remarks, dealt with the use of pituitrin. Use of this agent should only take place if one was quite sure of the condition under treatment. It was essential that the type of presentation of the fœtus should be known and that no condition of relative disproportion between fœtus and the maternal pelvis should exist. Pituitrin was of particular use in uterine inertia. This latter condition was frequently met with in bull bitches and he had used pituitrin in such cases with success. He also pointed out that, with reference to the treatment of chorea, it would be inadvisable to expect complete success when the condition had been of long standing. It was his considered opinion that in such conditions as chorea, when the symptoms were produced as a result of the action of a neurotrophic virus, permanent damage had occurred in certain nerve centres, and when such damage and tissue change had taken place, recovery, in the true sense of the word, was unlikely.

Dr. White briefly referred to the questions put. He agreed with Mr. Tudor Hughes that thyroid products were not destroyed by the gastric juice, for the simple reason that the thyroid was a natural secretion *via* the œsophagus. As to the cost of various gland products, he feared he was one of those people who did not take cost into the reckoning. He realised, however, that the cost of such a product as liquor folliculi in the case of cows would be altogether outside the range of practical medicine.

In making suggestions regarding gland therapy, he quite admitted it would be necessary to exclude some of the larger animals, largely, again, on the question of cost.

On the other hand, much could be done in the case of valuable dogs. The veterinary profession, he added, was indebted to Mr. Livesey for the first practical suggestion regarding the possibility of pituitrin in canine practice and explained that he had not said anything about the conditions which obviously must be present before pituitrin could be safely administered, for the simple reason that his time was necessarily limited.

He was not aware that a parathyroid extract had ever been administered hypodermically in the treatment of chorea in dogs, but would be very willing to co-operate in such an experiment. For oral administration $\frac{1}{20}$ gr. twice a day or $\frac{1}{10}$ gr. once a day would appear to be a satisfactory dose. In the human subject it was necessary to give larger doses and presumably that would be a suitable dose for a dog. In his experience, it was a good idea to administer parathyroid in conjunction with milk. There was, as a matter of fact, sufficient calcium in a glass of milk daily to furnish all the calcium that could be utilised by the parathyroid.

Dr. White referred to the advantage of administering adrenalin in combination with cocaine and explained that, quite apart from the fact that such a combination enabled the veterinary surgeon to operate in what was practically a bloodless field, at the same time the diffusion of the cocaine was retarded and a larger dose of such a local anæsthetic could be used. He believed that in some cases too much adrenalin was used; he considered 1 : 100,000 sufficient.

He had been asked how to restore the hormone balance, but was afraid that it would be quite impossible to put on paper just how this could be adjusted. It required very careful clinical and, sometimes, laboratory observation.

Referring to the possibilities of pituitrin, Dr. White said that the veterinary surgeon was sometimes apt to overlook the fact that it was probably the most valuable cardiac stimulant that we had at our disposal to-day and was, in his own opinion, far preferable to such drugs as strychnine and similar restoratives.

The PRESIDENT suitably thanked Dr. White for his address and the doctor briefly responded.

H. J. DAWES,
Hon. Secretary.

Dumfries and Galloway Division.*

A meeting of the above Division was held in Carlisle on Thursday, May 5th, 1927, when the following members and visitor were present:—The President (Mr. J. G. Bell, Carlisle) in the chair, Messrs. R. C. Robinson (Carlisle), R. Simpson (Carlisle), A. J. Milligan (Annan), W. L. McKenzie (Annan), J. Lindsay (Dumfries), F. Croudace (Corbridge-on-Tyne), W. Scott (Penrith), and A. Young (Hon. Secretary). *Visitor*:—Mr. J. Brennan (Wigton).

Apologies for absence were intimated from Messrs. A. Edgar (Whithorn), S. Littler (Thornhill), and J. Waddell (Kirkcudbright).

The meeting was preceded by "high tea," to which the company were hospitably entertained by the President. The gentleman who was to have read a paper was unfortunately not able to be present, so that an impromptu discussion by some of the members, on topics of interest, helped to pass a pleasant and profitable hour.

The letter from the N.V.M.A. concerning cows reacting to the tuberculin test and their control was considered, and the unanimous opinion of the members was that in principle they were agreed that everything possible should be done to eradicate tuberculosis from the herds of this country, but that, considering the present financial state of the country, the time had not arrived when full compensation could be paid for reactors, and that until such time did arrive, any attempt to control reaction of animals would be a retrograde step, as there was no doubt that it would be the means of putting a stop to a great deal of tuberculosis eradication which was at present being done, voluntarily, by individual stock-breeders.

New Members.—Messrs. A. S. Ferguson (Lockerbie) and J. Brennan (Wigton) were unanimously nominated as members of the Division, and the election as new members of Messrs. Davidson (Dumfries), Little (Carlisle) and Davidson (Castle-Douglas)—proposed at the last meeting—was confirmed.

Next Meeting.—After considerable discussion it was agreed to hold the next meeting of the Division at Dumfries some time during December.

* Received on 7th June, 1927.

Yorkshire Division.*

ANNUAL MEETING AT LEEDS.

The Annual Meeting of this Division was held at the Hotel Metropole, Leeds, on Friday, 29th April, 1927, with Mr. W. A. Campbell in the Chair. The following were also present:—Messrs. MacCarmick, Gentle, Robinson, Bowman, Sampson, Hayes, Gaunt, Ackroyd, Halstead, Hamilton, W., Hamilton, D., Ellison, Woodrow, Rankin, Secker Smith, Holland, Johnson, Scott, Procter, Clarkson, Pollard, Angler, Child, Watson and T. C. Hall, *Hon. Secretary.*

Visitors.—Messrs. Thompson, Powley, Brennan, and Rider.

The CHAIRMAN said his first duty was a sad one. He referred to the death of two old members, Mr. S. Chambers, of Kirkheaton, and Mr. Philip Deighton, of Selby. They were both well known to all the members, they were much respected, and the Division was the poorer by their deaths.

A vote of condolence with the relatives was moved by Mr. CLARKSON, and was passed by the members standing in silence.

The Minutes of the previous meeting of the Division were taken as read.

Apologies for non-attendance were received from Major Rabagliati, Messrs. Abson, Pillers, Fletcher, and McKinna (who was undergoing a serious operation).

The CHAIRMAN moved, Mr. POLLARD seconded, and it was agreed, that a letter of sympathy and best wishes for his early recovery be sent to Mr. McKinna.

Mr. J. G. DEANS, of Bishop Auckland, then read a paper on "Practice versus Theory," which promoted a good discussion in which part was taken by Messrs. Sampson, Bowman, Woodrow, Scott, Clarkson, Ackroyd, Procter, Pollard and Hamilton.

* Received on June 9th.

A hearty vote of thanks to Mr. Deans was accorded with applause.

Nominations.—The following new members were nominated: Major Rabagliati, and Mr. Brekke.

R.C.V.S. Council Election.—It was moved by Mr. CLARKSON, seconded by Mr. GENTLE, and resolved, that the Division appoint Major Rabagliati as their official nominee for the Council of the R.C.V.S.

Mr. BOWMAN reported that, in attending a Friesian sale at York, he noticed in the catalogue that several of the cattle had been tested by an unregistered man. It was resolved that the Auctioneers, the British Friesian Society and the local Society be communicated with on the matter, and Mr. Clarkson arranged to bring it before the "National" Council.

CASES OF INTEREST.

Several interesting cases were brought before the members.

Mr. WATSON said he had been called in to make a *post-mortem* on a sow that had a litter and died a few days later, though everything had been in order the night before she farrowed. By the colour of the membranes and teats he came to the conclusion that it bled to death. On opening it, the abdomen was found full of blood, and he found loose in the bowels a pebble about the size of a five shilling piece and an inch thick, with a capsule round it. There was a rupture of the posterior aorta about two or three inches long.

Mr. SAMPSON produced a specimen of a portion of the neck of the womb and vagina of a Suffolk ewe, which he had had to have slaughtered to extract two live lambs. On the specimen being cut open, there was found to be a good deal of fibrous thickening of the neck of the uterus.

Mr. PROCTER (York) mentioned the case of a horse that had been lame for three or four months and was destroyed because it got no better. He found that the first rib was broken in two and that the separated ends were lying four inches apart.

Mr. CLARKSON instanced a pit pony that had run away and had caught the back of its scalp on an iron girder. The membranes of the brain could be seen through the hole made. It had healed over and the pony was now working.

Mr. ACKROYD asked whether sheep ever suffered from anything approaching milk fever, as he had met with a similar condition in these animals.

Mr. BOWES said the condition described was known in Yorkshire in the moorland districts as "trembling." Professor Gaiger was making an enquiry about it. His own view was that it was a toxin poisoning associated with the digestive system, only occurring at lambing time. Inflating the udder was very successful, and also the injection of a little glycerine and water into the rectum.

The PRESIDENT said he had been puzzled about a cow to which he had been called in, until he was informed by a neighbouring farmer that the owner had given her a pint of paraffin as a cure for being blown up. The cow was in agony through stomach trouble.

Rules.—It was moved by Mr. McCARMICK, seconded by Mr. CLARKSON, and resolved, that the Rules of the Society be revised by the Council and submitted to a general meeting.

Mr. SCOTT gave notice that at the next meeting he would propose that a donation of ten guineas be given from the Society to the Royal Veterinary College Building Fund.

A vote of thanks to the Chairman concluded the proceedings.

T. C. HALL,
Hon. Secretary.

Eastern Counties' Division.*

ANNUAL MEETING AT IPSWICH.

The Fifty-first Annual General Meeting of the Eastern Counties' Division of the N.V.M.A. was held at the Great White Horse Hotel, Ipswich, on April 7th, 1927. The President, Captain Turner, in the Chair, was supported by Colonel W. A. Wood, Major A. F. Castle, Major T. G. Heatley, Messrs. W. Howes, H. L. Roberts, W. F. Loveless, H. Heggarty, J. F. Smith, C. C. Nesling, W. Turtill, W. Shipley (Hon. Secretary), and Messrs. J. D. Taylor, and G. A. Tomlin, as visitors.

The minutes, as appearing in the *Veterinary Record*, were taken as read.

Mr. TURTILL said that they had a most enjoyable and instructive time at the last meeting at Norwich, and he would be interested to know the results of the operations.

The HON. SECRETARY then gave a brief resumé of these cases.

Letters were then read from Mr. W. Livock and Mr. G. Kerry, both of Newmarket, intimating their wish to resign their membership. These resignations were accepted with regret.

A notice from the Royal Sanitary Institute was read inviting delegates to be sent to their Congress to be held at Hastings in July. It was resolved that no delegates be sent.

It was unanimously resolved to elect Mr. Philip Turner, of Ixworth, an Honorary Associate of the Division in recognition of his long connection with it and to extend a hearty welcome to him any time he felt disposed to attend the meetings.

The PRESIDENT moved the adoption of the balance sheet. This was seconded by Colonel WOOD, and carried unanimously.

The Hon. Secretary was instructed to attempt to collect all outstanding subscriptions, any of over three years' standing to be removed from the list of membership.

The sum of £5 5s. was voted to the Victoria Veterinary Benevolent Fund, as usual.

It was resolved to pay the reasonable expenses of one delegate attending the Council and Committee meetings of the N.V.M.A. Captain Turner, Colonel Wood, and the Secretary were elected to represent the Division on this Council.

It was resolved to hold the next meeting in July, at Cambridge.

This concluded the business part of the meeting, and the members were entertained to tea by the President.

W. SHIPLEY,
Hon. Secretary.

* Received on June 29th.

Derbyshire Division.*

Technique of the Diagnosis of Diseases under the Diseases of Animals Acts.

A meeting of the above Division was held at the Royal Hotel, Derby, on Tuesday, April 12th, 1927. The President, Mr. G. J. Furness, presided, and there were also present Mr. W. T. S. Atkinson, Major T. V. Bagshaw, Messrs. H. S. Cockburn, J. C. Deville, P. M. Evershed, J. D. Fulton, J. C. Heather, G. Howe, W. J. Ironside, A. Levie, H. McIntyre, H. W. Steele-Bodger, E. Wilkinson and O. V. Gunning, Hon. Secretary.

The Visitors included Messrs. E. J. Heather, A. H. Hunter and W. Tweed.

Apologies for absence were received from Messrs. E. Harrison, F. T. Prince, W. F. Aston and J. McClement.

The Hon. Secretary was instructed to write to Mr. Prince wishing him a speedy return to health.

The minutes of the last meeting were confirmed.

Nomination.—Mr. Percy Abson was nominated for membership of the Division.

Election.—Mr. J. D. Fulton (Derby) was unanimously elected a member of the Division.

Correspondence.—A letter was read from the General Secretary of the N.V.M.A. regarding the control of cows reacting to the tuberculin test. It was resolved that the time had not arrived for this to be carried out.

Mr. W. Tweed, M.R.C.V.S., D.V.S.M., then gave a resumé of the technique which can be carried out by the average part-time inspector in the diseases under the Diseases of Animals Act, with a demonstration of microscopic slides of the different diseases, etc.

Mr. Tweed said: When your Secretary asked me to come and choose my own subject to-day, I thought a few remarks on the technique—particularly the microscopic technique—carried out by the part-time inspector in the diagnosis of diseases under the Diseases of Animals Acts might interest you.

In the diagnosis of these diseases it is essential to use some test other than clinical symptoms before a definite diagnosis is given, and microscope technique is a great aid to diagnosis and should be carried out as much as possible by the part-time inspector.

The carrying out of microscopic technique requires a certain amount of time and it is easy to understand how much this test may be neglected, especially the examination of milk samples for the presence of tubercle bacilli, which is sometimes tedious to perform. The result is that, when it is not compulsory that the microscopic diagnosis be made by the veterinary inspector himself, the material has been forwarded to a laboratory for diagnosis. This procedure might be defended on the grounds of obtaining a bacteriologist's opinion, yet in the more common diseases under the Diseases of Animals Acts the clinician should carry out the microscopic diagnosis himself and so complete the case as efficiently and as quickly as possible.

The purchase of a few laboratory fittings, if these are kept in an improvised laboratory, will be found very profitable and convenient in carrying out microscopic technique. A microscope with two-thirds, one-sixth and one-twelfth objectives, a centrifuge (electric preferred), glass slides, and stains, are essential for the tests; a bunsen burner, water tap and electric lighting for the microscope should also be arranged for where possible, but these can be substituted by other means in country districts.

The different methods of staining in the various diseases can be found in any text-book on bacteriology, and the stains can be purchased already prepared, so that I need not do more than mention the method in the following diseases.

Abortion.—This is a scheduled disease, although the administration of the Contagious Abortion Order is practically *nil*. An early diagnosis is very essential on account of its infectivity. A microscopic diagnosis may be carried out by making a smear from the placenta of an aborted cow. The smear is dried and fixed, and then stained by the carbol-fuchsin method. If there is a large number of short pink-stained bacilli present, a sample of the cow's blood should be sent to a laboratory for the agglutination test. The agglutination test, however, is the most reliable in cases of abortion, so that the microscopic examination in this disease is optional and a sample of blood should preferably be examined by the agglutination test in a laboratory.

Anthrax.—It is obligatory on the local authority's veterinary inspector to make a microscopic examination of the blood in order to be able to deal with the carcase by cremation or otherwise. The microscopic test in anthrax is quite satisfactory for diagnosis if properly carried out. In positive cases an unstained smear and swab are forwarded to the Ministry's laboratory for confirmatory diagnosis and a contrary diagnosis has sometimes been made by the Ministry's laboratory to that of the authority's veterinary inspector. These occurrences, however, are rare if care is taken in examining the smear before sending the material. The technique is to take a drop of blood from a superficial blood-vessel, make a fairly thick smear on a slide, dry and lightly fix; when cool, stain with 1 per cent. aqueous solution of an old solution of methylene blue for 1 to 2 minutes. then wash in water, dry and examine. When the slide is thoroughly dry, if it is a positive smear, a purple-coloured reaction is often well marked and when examined under the microscope shows the purple coloration very distinctly, with the presence of a large number of square-ended anthrax bacilli in chains and scattered irregularly throughout the field. In negative blood, when the slide is dried, one usually gets a dull blue or greenish colour, and when examined microscopically there may be either no bacilli present or numerous round-ended rod-shaped bacilli may be seen. In the examination of fresh blood it is not difficult to give a definite opinion, but in animals which have been dead some considerable time it can be difficult, as the majority of the bacilli may have disappeared or the blood may have become invaded with putrefactive organisms resembling the anthrax bacilli in appearance. In these cases you can see microscopically the purple capsular material shown as irregular purple masses throughout the smear, and if anthrax bacilli are present they can be distinguished from the putrefactive bacilli by their square ends, or encapsulated in a purple

* Received on June 14th.

capsule. If still in doubt, a Gram stain may help, the anthrax bacilli being Gram positive and square-ended.

Contagious Pleuro-Pneumonia, Epizootic Lymphangitis, Sheep Pox, Rinderpest.—I propose to omit these, as they have been absent from this country for some time.

Foot-and-Mouth Disease.—The diagnosis is made by clinical symptoms and if any doubt exists in the diagnosis it is advisable to report to the Ministry.

Glanders.—In this disease a microscopic examination may be made from the nasal discharge, but it is preferable to apply the mallein test for definite diagnosis.

Mange.—In horses two forms are scheduled, *viz.*, sarcoptic and psoroptic. In sheep scab, sarcoptic, psoroptic and symbiotic are all included as the causal parasites in the disease sheep scab, but *Psoroptis ovis* is the causal parasite of the common body sheep scab. The microscopic examination of scrapings from horses gives good results provided a deep scraping has been taken and a horse has not been dressed with some parasiticide a short time previous to taking the scraping. The scrapings can be put into a test tube, moistened and centrifuged, and the deposit examined microscopically, or it can be put into a 10 per cent. or a 20 per cent. KOH solution and boiled for a few minutes, then centrifuged for two or three minutes. The KOH is poured off and the deposit is spread on a slide and examined microscopically with the two-thirds lens. Another method is to take the scrapings into small glass containers which are kept at body heat and a in short time the parasites can be seen leaving the débris ; the glass lid magnifies their size, or they may be seen moving by an ordinary hand lens. If these methods fail to reveal the parasites, another fairly reliable method is the sugar solution method. In this method the parasites float on the surface of equal parts of a sugar solution composed of 1lb. sugar dissolved in three-quarters of a pint of water, and water, when centrifuged, the density of the sugar solution being greater than that of the parasites. The skin scrapings are boiled in KOH solution and centrifuged as before ; the KOH is poured off and to the deposit are added equal parts of water and of sugar solution ; the deposit and the solutions are mixed and again centrifuged, and by a cover glass held by a bit of plasticine the surface of the fluid in the centrifuge tube is just touched with the cover slip and the parasites floating on the top adhere to it. The cover slip is then put on a glass slide and examined microscopically. In sheep scab the microscopic procedure is similar to that in mange.

Tuberculosis.—This is the most important disease with which we have to deal at the present time and one in which the diagnosis by microscope technique should play a large part. Wherever any symptoms of the disease exist, any available material, such as sputum and milk, should be taken and examined ; in fact, wherever sputum can be found on the wall in front of a cow which is definitely coughed up by that cow, a smear on a slide should be made and stained for tubercle. There is a small percentage of sputum specimens which contain no tubercle bacilli, but if tubercle bacilli are found in a specimen it is definite evidence that the cow's lungs are extensively diseased. I have found the microscope examination of sputum most helpful and reliable for diagnosis under the Tuberculosis Order and would recommend you all to practice it wherever possible. The microscopic examination of milk is tedious and I feel certain that many cows with chronic induration of the udder met with in cattle practice would be diagnosed as tuberculous if more samples of their milk were examined. The strippings are best for examination for tubercle bacilli. Centrifuge the milk for 15 to 20 minutes, then heat the cream end of the centrifuge tube through the flame and pour off the supernatent fluid ; keep the tube inverted to prevent the cream running back on the deposit and then make as thin a smear as possible from the deposit, dry in air, fix and stain by the Zeihl-Nielson method. If the bacilli are plentiful it may not take a long search to find them, but if they are not it may take some considerable time.

There are roughly four types of milk which might be taken from indurated udders as suspicious until one is able to eliminate the non-suspicious udder clinically, *viz.* : (1) That from a T.B. udder ; (2) from a T.B. udder complicated with mastitis ; (3) from a chronic induration, which usually follows acute inflammation of the udder ; (4) from an udder in a state of suppuration or acute inflammation. If no bacilli are found it is advisable to examine the cells present, as the cellular content is a good time-saving guide in searching for bacilli. In any old-standing chronic induration you get a certain percentage of epithelial cells in the milk which show in Z.-N. staining as large oval, pale-blue cells. In any inflammatory condition, pustular condition or in induration following the former, you get a high percentage of leucocytes which stain as small dark-blue irregular cells. In all milks you also get a fair percentage of small, round, dark-blue cells which are lymphocytes. In milk from a tuberculous udder you get a large percentage of epithelial cells and lymphocytes and there are also present in the majority of T.B. samples characteristic clusters of six or more epithelial cells close together or overlapping one another. These clusters should be looked for in the examination of milk for tubercle bacilli and the smear can be quickly searched with the high power lens for them. The presence of these clusters or a high percentage of epithelial cells in the milk is highly suggestive of the presence of tubercle bacilli and search should be continued for some time, and if unsuccessful the milk may be sent for the guinea-pig test. If the microscopic examination cannot be carried out in T.B. cases through lack of material, etc., and a tuberculin test is required, the intradermal test is, in my opinion, the most satisfactory for the Tuberculosis Order diagnosis, but recourse to the tuberculin test should be seldom necessary.

In *Rabies*, microscopic examination is not attempted by the local authority inspector and the only procedure necessary is to *post-mortem* the affected animal and forward the head of the dog to the Ministry's laboratory. Particular attention should also be paid to the isolation of the in-contact or any suspected animals.

This concludes the resumé of the technique in the different diseases and the smears under the microscope will, I hope, explain many points which I have mentioned.

I am indebted to A. W. N. Pillers, Esq., F.R.C.V.S., D.V.S.M., who has kindly lent me specimens of mange, sheep scab and forage acari for this demonstration.

Mr. Tweed then gave a demonstration of microscopic slides of the different scheduled diseases, the parasites of mange and sheep scab, and also slides showing the different cells found in milk samples.

(*To be continued*).

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Sept. 12-17th—N.V.M.A. Congress at Torquay.

July 11th—Meeting of the Editorial Committee, N.V.M.A., at 4-30 p.m.

July 12th—Meeting of the Derbyshire Division at the Royal Hotel, Derby.

July 12th—20th—Oral Examinations, R.C.V.S., London, Liverpool, Edinburgh, Glasgow and Dublin.

July 26th—Meeting of the Central Division at New Haw, Surrey.

July 29th—Meeting of the North Wales Division at Llanrwst.

The R.C.V.S. Council Meeting.

Two matters arising at the meeting of the Council of the Royal College of Veterinary Surgeons, held on the first day of this month, call for special and preliminary comment this week—the full report of the proceedings will be published later.

The first is the signal dignity conferred by the Council upon Lieut.-Col. J. W. Brittlebank, C.M.G., M.R.C.V.S., D.V.S.M., in re-electing him to the office of President of the College. We join with our colleagues in congratulating Colonel Brittlebank upon this outstanding tribute to his efficiency and popularity.

In the nature of a testimony to true merit, also, was the second noteworthy event—a presentation to Mr. Fred Bullock, the Secretary, of a very handsome silver tea and coffee service and tray in commemoration of his twenty-first re-election as Secretary and Registrar to the College. The service, which is the best Sheffield silver ware, was made by Messrs. Sisson's, of Sheffield, and was obtained through the good offices of Major Abson, Treasurer of the College. Mr. E. Alfred West acted as Treasurer of the Presentation Fund, which was confined to Members of Council. In making the presentation, the President, in a felicitous speech, expressed the appreciation of the Members of Council of Mr. Bullock's services to the profession during the past twenty years.

Edinburgh College Prize Distribution.

The annual prize distribution of the Royal (Dick) Veterinary College, Edinburgh, was held in the hall of the College Buildings on 29th June. Dr. T. G. Nasmyth, who presided, advised the students to cultivate the friendship of the medical practitioner. Each would be able to tell or suggest something of mutual interest and utility in the domain of comparative pathology. It might be thought that the veterinary surgeon had been a great deal displaced by the advent of the motor car, and no doubt the immense displacement of horses for transport work by the advent of the mechanically-driven vehicle had diminished veterinary work among heavy draught horses and carriage horses. But a new sphere had been set up by the association of the veterinary practitioner with public health administration, in safeguarding meat and milk supplies. The appointing of county veterinary inspectors for similar purposes opened up a new and wide field of work.

Since the war the College had gradually developed a post-graduate side to its work, with a view to preparing men for specialist appointments, and considerable success had attended the endeavour. The specialist, however, formed only the smaller part of the profession. The general practitioner was—and must remain—its backbone. To that fact the College was fully alive. (Applause.)

Principal Bradley thought he might make with perfect honesty the usual claim that the session had been successful. There was, he said, no doubt that appointments to-day were getting more and more plentiful. Not only was that the case at home, but also abroad. There was no question that the number of overseas appointments would increase in the near future. The veterinary profession was not only not overcrowded, but was going to be considerably understocked.

The Lord Provost, having presented the medals, delivered a brief address. For a number of years, he said, he was on the Board of Directors of the College. They were always wondering then as to how far the profession would go. For the past week he had been in one of the big farming districts, and he came back impressed with the conviction that there was a great future still for the horse. He hoped the College would continue to succeed; it had had a great reputation in the past. (Applause.)

Sir Norman Walker proposed a vote of thanks to the Lord Provost, and the donors of prizes were thanked on the motion of Sir Leslie Mackenzie. Sir Leslie Mackenzie remarked that the principal donor of the prizes was the Highland and Agricultural Society. Scotland, he said, owed a great deal to that Society, which might be denominated an extra mural branch of the College. There was a great future before the veterinary profession: it had relations with every phase of social life.

The following was the prize list:—

	Silver Medal.	*Bronze Medal.*
Junior Anatomy	G. N. Sutherland.	A. E. Stevenson.
Practical Anatomy	J. Oman d.	—
Biology	W. G. Robinson.	J. Omand.
Chemistry	A. E. Stevenson.	J. Omand.
Practical Chemistry	—	W. G. Robinson.
Senior Anatomy	A. P. Steele.	J. Anderson.
Practical Anatomy	A. P. Steele.	—
Histology	—	A. P. Steele.
Physiology	A. P. Steele.	W. H. Horne.
Practical Physiology	—	A. S. W. Buchanan.
Zootechny	W. S. Davison	A. P. Steele.
Materia Medica	W. P. Blount	S. Simpson
Pathology	R. W. Paley.	A. Malaga.
Bacteriology	R. W. Paley.	A. Malaga.
Hygiene	W. P. Blount.	D. Kennedy.
Surgery	J. M. Cummine.	G. Johnson.
Obstetrics	R. Moore.	G. Johnson.
Medicine	G. Johnson.	J. M. Cummine.
Clinique	G. Johnson.	J. M. Cummine.
		A. S. Watson.
Parasitology	—	G. Johnson.

Best Aggregate for Final Year—G. Johnson. Gemmell Scholarship—J. B. M'Kinna.

The Gemmel Scholarship, recently founded by a former member of the staff, is awarded to the student who obtains the highest marks in chemistry and physiological chemistry. It is tenable for two years.

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B.Sc. (Vet.Sc.) Degree.—The following graduates of the Royal (Dick) Veterinary College, Edinburgh, have successfully completed the course and obtained the Degree of B.Sc. (Vet. Science) conferred by the University of Edinburgh:—

J. N. Ritchie, M.R.C.V.S., D.V.S.M., Edinburgh.
R. M. Davidson, M.R.C.V.S., Inverness.

Colonial Appointments:—The following appointments have been made by the Secretary of State for the Colonies during the month of June, 1927:—

Appointment.	*Colony.*
Mr. W. R. Wallace, M.R.C.V.S., Veterinary Officer	Federated Malay States.
Mr. G. F. Elliott, M.R.C.V.S., Veterinary Officer	Northern Rhodesia.

Death of Mr. R. T. Huston, Armagh.

"A very wide circle of friends and sportsmen throughout County Armagh will regret to learn of the death of Mr. R. T. Huston, M.R.C.V.S., Dean's Bridge, Armagh, which took place at the Armagh County Infirmary early yesterday morning. Mr. Huston was a well-known and popular figure in the life of Armagh," says the *Belfast News-Letter* of 24th June.

"A son of the late Dr. Charles Todd Huston, Tynan, the deceased for a long number of years carried on a successful veterinary practice in Armagh, and his services as a lecturer on veterinary hygiene were frequently requisitioned for meetings of farmers.

"He was secretary of County Armagh Agricultural Committee and the Joint Technical Instruction Committee from their inception. Deceased took a prominent part in the promotion of the local war memorial, and his two sons served with distinction in the Great War.

"Mrs. Huston predeceased her husband nearly two years ago."

Traffic in Horses.

Mr. Guinness, Minister of Agriculture and Fisheries, in a written answer to Mr. Ammon, details the steps that have been taken to put in force the recommendations of the Departmental Committee on the exportation of horses to the Continent.

The attention of port inspectors, he states, has again been called to their powers to slaughter rejected horses. Progress is being made in insisting on the full requirements as regards the fittings of vessels engaged in the traffic. Some vessels have been withdrawn, and provision has been made during the last three years of 15 new vessels, complying with standard regulations. An order will be made shortly to guard against the carrying of horses during rough weather at sea. The Ministry has made efforts to persuade shippers and shipping companies to improve conditions in the carcase trade.

An Official Poultry Film.

The Ministry of Agriculture recently arranged for a private view in the Cinematograph Theatre at the War Office of the new film that has been prepared for exhibition at the World's Poultry Congress in Canada. The film is intended to represent all aspects of the British poultry industry, and is interesting and informative rather than highly technical. Parts of a film previously exhibited have been included, but new pictures have been made covering all sections of the National Poultry Institute. These show the official opening by the Duke of York at the Harper Adams Agricultural College, with phases of the work being accomplished at that institution, at the South-East College, Wye, at Reaseheath, at the School of Agriculture, Cambridge, and at the Ministry's veterinary laboratory at Addlestone. One of the new features deals with an up-to-date egg farm recently established in Lancashire.

Export Trade in Live Stock.

Past experience induces caution in referring to freedom from restricting diseases, but it is permissible to allude with gratitude to the welcome immunity from hampering regulations in the movement of animals which the eradication of foot-and-mouth disease has conferred. Not only have the United States, Canada and other countries withdrawn all impediments to the importation of British live stock, but business has begun to develop on a scale that is highly promising, and will prove of great benefit to our stockbreeders. Consignments of cattle, sheep and pigs are finding their way abroad, and it is expected that the demand will increase as the season progresses. The Royal Show is a favourite meeting place for stockowners from overseas, but already the shipment of 262 sheep in one lot from Scotland to Canada may be interpreted as indicative of the improvement that freedom from foreign diseases would bring to our great business of high-class stock production.—*The Times.*

Notanda.

Brown-Sequard's disease, a lesion of one lateral half of the spinal cord causing paralysis of motion on one side and of sensation on the other, was described by Charles Edouard Brown-Sequard (1818-1894), French physiologist.

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The professor of Assyriology at Johns Hopkins University has recently deciphered a tablet, unearthed by explorers for that institution, which discloses that Noah was a veterinarian.

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The Ark is said to have been 1,600 feet long by 90 feet wide, and to have had seven decks. What interests us most is the wisdom shown by our Maker in selecting a "doctor of animals" for the commission of preserving the animal kingdom to posterity. (*Nth. Amer. Vetn.*).

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Barbituric acid derivatives (veronal, luminal, etc.), according to Gruber and Roberts (*Jnl. Pharmacology and Experimental Therapeutics*, May, 1926), are helpful in the treatment of epilepsy because they cause a dilation of the cerebral blood vessels.

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Extirpation of a diseased kidney was first performed in 1869 by Simon. In the same year was made the discovery of the hypnotic properties of chloral hydrate by O. Liedreich.

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In 1822 iodoform was discovered by G. S. Serullas; and the stomach pump was invented by Bush. H. K.

H.M. Stationery Office Publications.

The undermentioned have been published during the week. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses:—London: Adastral House, Kingsway, W.C.2, and 28 Abingdon Street, S.W.1; Cardiff: 1 St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120 George Street.

	Price Net s.	d.	*Post Free* s.	d.
House of Lords Papers and Bills, 1927.				
(74) Protection of Animals (Amendment) Bill to amend the Protection of Animals Act, 1911	0	1	0	1½
Command Papers.				
2881. Scottish Board of Health. Eighth Annual Report, 1926	6	6	6	11
2887. Royal Commission on Agriculture in India. Second Interim Report, May, 1927	0	1	0	1½
House of Commons Bills, 1927.				
150. Slaughter of Animals (Scotland). To provide for the Humane Slaughter of Animals in Scotland	0	1	0	1½
164. Dogs and Cats. To facilitate the recovery of lost Dogs and Cats ...	0	1	0	1½
Ministry of Agriculture and Fisheries.				
Register of Dairy Cattle with Authenticated Milk Records, for the year ended Oct. 1st, 1926. Vol. X. 24-0022-10-26	1	0	1	0
Handbook of Diseases of Animals and Orders thereunder. Amendments (No. 2), June 1st, 1927. 24-0037-02-00 ...	0	4	0	5

CORRESPONDENCE.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.
All correspondence must bear the name and address of the contributor for publication.
The Editor does not hold himself responsible for the opinions of his correspondents.

Mycosis in the Hen.

To the Editor of The Veterinary Record.

Sir,—I claim the hospitality of your journal to reply to the objection made by Mr. Mayall in your number of June 18th last, concerning my communication on "Mycosis in the Hen."

I maintain my way of thinking, and I consider that the affection with which we are concerned is not gout.

I know Kaupp's works, and the lesions he indicates in no way resemble those I observed and described in my publication. Properly speaking, there were no chalky desposits; the small foci I mention are shining, very nacreous, formed exclusively of a filamentous mycelium, which is easily seen under the microscope without staining. Further, it is especially with these particles that one can obtain the culture of the fungus on Sabouraud's gelose or on carrot; this culture can not be reproduced from the lesions of gout. I have never found crystals of uric acid either in the kidneys or the cloaca; the disease, therefore, bears no resemblance to gout. The only weak point in my demonstration is that I found it impossible to reproduce the disease by inoculation or ingestion, but my learned colleague, M. Brocq-Rousseu who recognised the culture as a *Nocardia dassonvillii* declared publicly in the Société Centrale that the pathogenic character of these Nocardia was very difficult to establish experimentally.

From the researches he made on the fungi of straw, hay, and oats, he recognised that it was certainly a case of the same parasite.

I add that since my communication I have had the opportunity of observing the disease in a young goose—the first time I have found it elsewhere than in the hen. The affection is somewhat akin to aspergillosis, not at all to gout.—Yours sincerely, C. Truche.

Doctor of Veterinary Science,
Laboratory Chief in the Pasteur Institute, Paris.

Urethrotomy in the Male Cat.

To the Editor of The Veterinary Record.

Sir,—Major Hamilton Kirk's article on the above subject is very interesting.

Urethral obstruction in the male cat is very common, especially in the castrated animal; although I have met cases in the uncastrated cat. It usually occurs in animals about four years old.

Major Kirk overcomes the obstruction by one of three methods.

1. Catheterisation.
2. Digital manipulation of the penis.
3. Urethrotomy at the ischial arch.

He says nothing, however, of the cystitis which is the cause of the condition occurring, or what steps he takes to prevent it recurring.

Catheterisation, in my opinion, is not a success. It is usually the terminal ½ inch of the penis which is obstructed and this can usually be removed by digital manipulation. In all cases I think the obstruction commences at the glands, where the orifice is very minute. At a *post-mortem* I held a few days ago, I found that the calculus extended from the glans into the pelvic cavity, and at the ischial arch the mass, which completely occluded the urethra, was ⅛ inch in diameter.

Whatever method is adopted merely overcomes the condition temporarily. There is always a diffuse inflammation of the bladder present and usually it is only a matter of a week or so before the obstruction recurs.

In the case previously mentioned there was also nephritis of both kidneys. They were about twice the normal size, yellow in colour and hæmorrhagic on section. The cortex was chiefly affected. To the naked eye, the medulla and pelvis appeared normal.

Not infrequently there is incontinence once the obstruction is removed and this will sometimes persist until the calculus reforms.

I have given hexamine with ac. sod. phos. and tinct. hyocyamus internally, but without much success.—Yours faithfully, J. G. Wright.

1 Fitzalan Place,
Cardiff,
June 30th, 1927.

"True Epilepsy in a Clydesdale Mare."

To the Editor of The Veterinary Record.

Sir,—With reference to Mr. T. M. Mitchell's article in your issue of July 2nd, the symptoms seem to me to point to "Globus Hystericus," of which I have seen four cases in forty years practice, the last one being in April of this year. —Yours faithfully, E. C. Winter, Capt., F.R.C.V.S.

The Editor acknowledges the receipt of the following:—

Report of the Director of Veterinary Research, Southern Rhodesia, for the year 1926.

Administration Report of the Government Veterinary Surgeon, Ceylon, for the year 1926.

Communications from Messrs. A. McCunn, J. F. D. Tutt, and W. Waters.

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